

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

1. (Currently Amended) A method of wireless transmitting data on a burst signal basis, the method comprising the steps of:

inserting at least one data symbol of a second modulation method based on a communication control information into a data symbol stream of a first modulation method, the at least one data symbol of the second modulation method being inserted into the data symbol stream contiguous to a data symbol of the first modulation method,

wherein the second modulation method has more modulation levels than the first modulation method,

wherein a number of data symbols of the first modulation method in a transmission burst is more than a number of data symbols of the second modulation method; and

transmitting the transmission burst including the data symbol of the first modulation method and the data symbol of the second modulation method.

2. (Currently Amended) A method of wireless receiving data on a burst signal basis, the method comprising the steps of:

receiving a burst signal, the burst signal including, in a transmission burst, a communication control information and a data symbol stream, the data symbol stream comprising a data symbol of a second modulation method inserted into a data symbol stream of a first modulation method, the data symbol of the second modulation method being inserted into the data symbol stream contiguous to a data symbol of the first modulation method,

wherein the second modulation method has more modulation levels than the first modulation method,

wherein a number of data symbols of the first modulation method in the transmission burst is more than a number of data symbols of the second modulation method,

wherein the communication control information is information for showing the first modulation method and the second modulation method used in the transmission burst, the communication control information being known to a transmitter; and

detecting a data symbol, on a symbol basis, based on the communication control information.

3. (Currently Amended) A wireless data transmission device of a communication system that carries out data communication on a burst basis by digital modulation, the transmission device comprising:

a data stream dividing means for dividing transmission data at a given ratio;

a first quadrature vector mapping means for providing a first divided data with a signal space diagram according to a first modulation method;

a second quadrature vector mapping means for providing a second divided data with a signal space diagram according to a second modulation method having a higher modulation level than the first modulation method based on a communication control information, the information being for determining a modulation level on respective data symbols and known to a receiver; and

a multiplexing means for placing a symbol modulated by the first modulation method and a symbol modulated by the second modulation method at given places respectively, then multiplexing a transmission burst, the symbol modulated by the second modulation method being multiplexed in a position contiguous to the symbol modulated by the first modulation method,

wherein the given ratio is defined by a number of data symbols modulated by the first modulation method being more than a number of data symbols modulated by the second modulation method.

4. (Currently Amended) A wireless data reception device of a communication system that carries out communication on a burst basis by digital modulation, the reception device comprising:

a reception process means for receiving a communication signal comprising at least one data symbol of a second modulation method being inserted into a data symbol stream contiguous to a data symbol of a first modulation method, then outputting a burst signal of the signal received;

a dividing means for dividing the burst signal received based on a communication control information at a given ratio, the information being for determining a modulation level on respective data symbols and known to a transmitter;

a first symbol detecting means for providing a first divided signal with symbol detection in response to a first modulation method;

a second symbol detecting means for providing a second divided signal with symbol detection in response to a second modulation method having a higher modulation level than the first modulation method; and

a data stream multiplexing means for placing a result detected by the first symbol detecting means and a result detected by the second symbol detecting means in a given order, and multiplexing a reception data stream,

wherein the given ratio is defined by a number of data symbols modulated by the first modulation method being more than a number of data symbols modulated by the second modulation method.

5. (Previously Presented) The method of wireless transmitting data as defined in claim 1, wherein the communication control information is a information representing: when communication quality is different at each data symbol position in the burst, a place where the data symbol of the second modulation method is inserted is assigned to a symbol position of which communication quality is considered in advance better than a position of the data symbol of the first modulation method.

6. (Previously Presented) The method of wireless receiving data as defined in claim 2, wherein the communication control information is a information representing: when communication quality is different at each data symbol position in the burst, a place where the data symbol of the second modulation method is inserted is assigned to a symbol position of

which communication quality is considered in advance better than a position of the data symbol of the first modulation method.

7. (Previously Presented) The wireless data transmission device as defined in claim 3 further comprising:

a communication quality information obtaining means for obtaining information about whether or not communication quality is different at each data symbol position in the burst; and

an insertion place detecting means for assigning, based on the information about difference in the communication quality, place where a symbol modulated by the second modulation method to a data symbol position of which communication quality is better than a position of the data symbol of the first modulation method.

8. (Previously Presented) The wireless data reception device as defined in claim 4 further comprising:

a communication quality measuring means for measuring communication quality at each data symbol position in the burst;

a communication quality information notifying means for notifying a transmission device of information about the communication quality measured by the communication quality measuring means; and

an insertion place information obtaining means for obtaining information about a place where the data symbol of the second modulation method is inserted.

9. (Currently Amended) A wireless data communication system comprising:

a wireless data reception device including:

a reception quality measuring means for measuring reception quality at each data symbol position in a burst received; and

a reception quality information notifying means for notifying a transmission device of information about reception quality measured by the reception quality measuring means, and

the wireless data transmission device including:

a communication quality information obtaining means for obtaining the information about the reception quality notified by the reception device; and

an insertion place detecting means for assigning, based on the reception quality information, an insertion place for at least one data symbol ~~of the~~ ~~of a~~ second modulation method into a data symbol stream of a first modulation method to a data symbol position of which communication quality is better than another data symbol position, the at least one data symbol of the second modulation method being inserted into the data symbol stream contiguous to a data symbol of the first modulation method,

wherein the second modulation method has more modulation levels than the first modulation method,

wherein a number of data symbols of the first modulation method in the transmission burst is more than a number of data symbols of the second modulation method.

10. (Previously Presented) The wireless data transmission device as defined in claim 3, wherein when the transmission device re-transmits, following a request signal of re-transmission, a part of redundant data of a burst already transmitted, the transmission device further comprises a means for superposing the partial redundant data to be re-transmitted to a data symbol position of the data symbol of the second modulation method.

11. (Previously Presented) The wireless data transmission device as defined in claim 10 further comprising:

an error correction coding means for correcting an error of a transmission data stream, outputting a coded data stream, and outputting a redundant section deleted at the coding through another channel;

a memory means for storing temporarily the section deleted; and

a re-transmission control means for supplying data of the redundant section stored to the second quadrature vector mapping means for superposing the re-transmitted partial data.

12. (Previously Presented) The method of wireless transmitting data as defined in claim 1, wherein in the step of inserting the data symbol of the second modulation method, known bit data is inserted in a part of the data symbol of the second modulation method, so that a signal space diagram at a modulation is limited.

13. (Previously Presented) The method of wireless receiving data as defined in claim 2 further comprising the step of:

estimating reception quality of a signal received by using a vector of the signal received at a data symbol position of the data symbol of the second modulation method, the data symbol having the higher modulation level being inserted in the burst partially on a symbol basis.

14. (Previously Presented) The wireless data reception device as defined in claim 4 further comprising a reception quality estimating means for limiting a placement of signal points by insertion of known bit data in a part of bits, and estimating communication quality by using a vector of a reception signal at a symbol position undergone a signal space diagram by the second modulation method.

15. (Previously Presented) The wireless data transmission device as defined in claim 3, wherein a signal space diagram of a data symbol undergone a signal space diagram by the second modulation method is placed away by a given Euclidean distance in response to an amplitude of a data symbol undergone a signal space diagram by the first modulation method.

16. (Previously Presented) The wireless data reception device as defined in claim 4, wherein a signal space diagram of a data symbol undergone a signal space diagram by the second modulation method is placed away by a given Euclidean distance in response to an amplitude of a data symbol undergone a signal space diagram by the first modulation method, and the second data symbol detecting means detects the data symbol placed as discussed above.

17. (Previously Presented) The wireless data transmission device as defined in claim 3 further comprising:

a transmission packet generating means for generating and outputting transmission data on a packet basis based on a process in a higher layer, and also generating a transmission packet which outputs information about a size of the packet; and

a transmission control means for detecting a quantity and an insertion place of the data symbol having the higher modulation level based on the information about a size of the transmission packet and information about a size of a burst in a physical layer, and for controlling a data separation by the data stream dividing means and a content of the burst generated by the multiplexing means based on information about a determined quantity and a determined insertion place about the symbol.

18. (Previously Presented) The wireless data transmission device as defined in claim 17, wherein the transmission control means controls the multiplexing means such that the information about the packet size is inserted in the transmission burst.

19. (Previously Presented) The method of wireless transmitting data as defined in claim 1 further comprising the steps of:

generating and outputting transmission data on a packet basis based on a process in a higher layer, and also generating a transmission packet which outputs information about a size of the packet; and

controlling transmission for detecting a quantity and an insertion place of the data symbol having the higher modulation level based on the information about a size of the transmission packet and information about a size of a burst in a physical layer, and controlling a data separation in a data stream dividing step for dividing a data stream based on information about a determined quantity and a determined insertion place about the symbol, and also controlling a content of the burst generated in a multiplexing step which generates a transmission burst.

20. (Previously Presented) The method of wireless transmitting data as defined in claim 19, wherein the transmission control step controls the multiplexing step such that the information about the packet size is inserted in the transmission burst.

21. (Previously Presented) The wireless data reception device as defined in claim 4, wherein data to be received is generated in a higher layer on a packet basis, and the reception device further comprises:

a reception control means for controlling a data separation by the dividing means and a content of the burst generated by the data stream multiplexing means based on information about a size of a transmission packet; and

a reception packet generating means for reconstructing packet data in the higher layer transmitted by using data of each reception burst supplied from the data stream multiplexing means.

22. (Previously Presented) The wireless data reception device as defined in claim 21, wherein the information about a size of a transmission packet is inserted in the reception burst, and a reception control means extracts a size of the transmission packet inserted in the burst.

23. (Previously Presented) The method of wireless receiving data as defined in claim 2, wherein data to be received is generated in a higher layer on a packet basis, and the method further comprises the steps of:

reception controlling for controlling a data separation in a dividing step and a content of the burst generated in a data stream multiplexing step based on information about a size of a transmission packet; and

generating a reception packet for reconstructing packet data in the higher layer transmitted by using data of each reception burst supplied from the data stream multiplexing step.

24. (Previously Presented) The method of wireless receiving data as defined in claim 23, wherein the information about a size of a transmission packet is inserted in the reception burst, and the reception controlling step extracts the size of the transmission packet inserted in the burst.

25. (Currently Amended) A method of wireless transmitting data for data communication, the method comprising the steps of:

transmitting burst configuring step for inserting at least one pilot symbol and at least one data symbol of a second modulation method into a data symbol stream of a first modulation method and configuring a transmitting burst, the data symbol of the second modulation method being inserted into the data symbol stream contiguous to a data symbol of the first modulation method,

wherein a data amount of each of the transmission burst transmitted by the second modulation method is more than a value multiplying a data amount transmitted by the first modulation method and a number of the pilot symbols; and

transmitting step for transmitting the transmission burst including the data symbol of the first modulation method and the data symbol of the second modulation method.

26. (Previously Presented) The method of wireless transmitting data as defined in claim 25, wherein the pilot symbol is inserted into the symbol stream of the first modulation method constantly, and wherein at least one data symbol of the second modulation method is inserted between the pilot symbols.

27. (Currently Amended) A wireless data transmission device that carries out data communication, the wireless data transmission device comprising:

a data stream dividing means for dividing transmission data at a given ratio;

a first quadrature vector mapping means for providing a first divided data with a signal space diagram according to a first modulation method and outputting a data symbol stream of the first modulation method;

a second quadrature vector mapping means for providing a second divided data with a signal space diagram according to a second modulation method and outputting a data symbol of the second modulation method;

a multiplexing means for inserting the data symbol of the second modulation method and a pilot symbol into the data symbol stream of the first modulation method and generating a transmission burst, the data symbol of the second modulation method being inserted into the data symbol stream contiguous to a data symbol of the first modulation method; and

a transmitting means for transmitting the transmission burst,

wherein a data amount of each of the transmission burst transmitted by the second modulation method is more than a value multiplying a data amount transmitted by the first modulation method and a number of the pilot symbols.

28. (Previously Presented) The wireless data transmission device according to claim 27, wherein the multiplexing means inserts the pilot symbol into the data symbol value of the first modulation method constantly, and inserts at least one data symbol of the second modulation method between the pilot symbols.